

(12) UK Patent Application (19) GB (11) 2 319 420 (13) A

(43) Date of A Publication 20.05.1998

(21) Application No 9623640.1

(22) Date of Filing 13.11.1996

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(51) INT CL⁶

G01S 13/93

(52) UK CL (Edition P)

H4D DRPC D260 D354 D356 D41X D512 D550 D58X
U1S S1820

(56) Documents Cited

US 3858204 A

(58) Field of Search

UK CL (Edition P) H4D DRPB DRPC DRPD
INT CL⁶ G01S 13/88 13/93, G08G 1/0962 1/16
Online:- WPI, INSPEC

(54) Parallel parking aid using radar

(57) A parallel parking aid comprises at least two radar transmitters and receivers arranged to detect the presence of objects 9,7 (eg other cars) at the side of the vehicle 5. First and second signals indicative of the positions of the obstacles are used to calculate the length of the parking space 3 and a display indicates whether a parallel park should be attempted. The system includes experienced/inexperienced settings or a difficulty scale. The parking aid can include four receivers/transmitters which provide information on parking spaces at the driver or passenger side. The radar system may also provide other driver information such as collision warnings or side vision aids. The transmitters and receivers are impulse radar sensors which utilise signals of short radio frequency without a carrier wave.

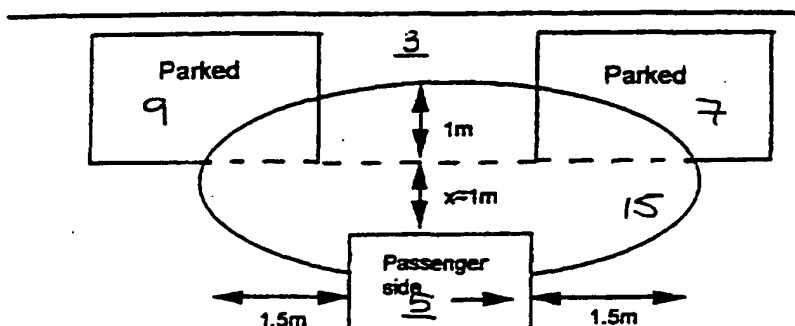
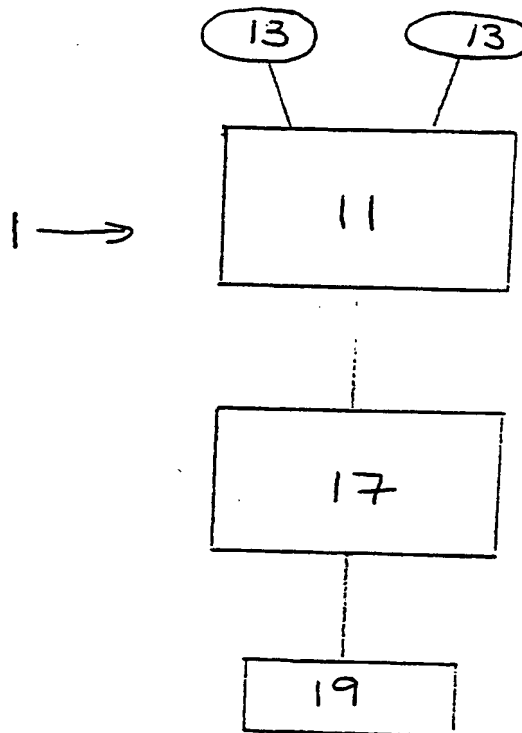


Figure 2. Required zone of coverage for Parallel Parking Aid

FIGURE 1

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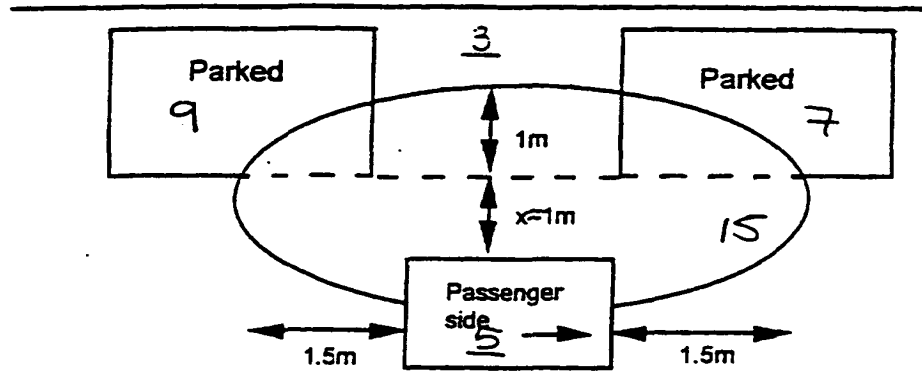


Figure 2 Required zone of coverage for Parallel Parking Aid

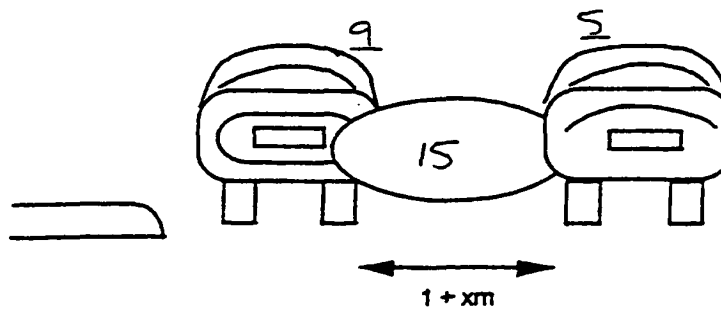


Figure 3 Side view of zone of coverage for Parallel Parking Aid

PARKING AIDField of the Invention

5 The invention relates to an improved vehicle parking aid for a motor vehicle.

Although a number of systems have been developed which act as parking aids, usually warning drivers of an obstacle in
10 their path when reversing, help with parallel parking has not been so forthcoming. On-street parking involves parking on the roadside, parallel to the direction of traffic. In many countries, especially within Europe, parallel on-street parking is the norm. Many drivers experience difficulties in
15 parking correctly, and some will not try to park this way. One reason is the added pressure on the driver to park quickly, so as not to interfere with normal traffic flow. Impatience, added to little knowledge of a cars length or inability to see the corners of the car causes a number of
20 unnecessary accidents to occur.

A number of radar systems have been proposed for installation in motor vehicles for detecting objects around a vehicle. Transmitters and receivers are mounted upon the
25 vehicle to detect the presence or approach of objects in a particular direction to be used to help to warn an occupant of a potential collision. Typically, such systems have been developed for collision warning and reversing aids.

30 Summary of the Invention

According to the invention there is provided a parallel parking aid for aiding parking in a space substantially parallel to the direction of the vehicle between a first and
35 a second obstacle, and comprising a radar sensing system including at least two radar transmitters and receivers arranged to detect the presence of an object in a pre-

- determined area in the region of the side of the vehicle, coupled to a microprocessor arranged to produce a first obstacle signal indicative of the position of the first obstacle, and a second obstacle signal indicative of the position of the second obstacle, and from those signals calculate the length of a parking space and feed a signal to a display to display whether a parallel park should be attempted.
- 10 The system may just provide a display which shows the length of a particular potential parking space and leave it to the skill of the driver to assess whether parking should be attempted.
- 15 Preferably however the microprocessor compares the length of the space with the length of the vehicle and provides a display indicating a yes/no signal as to whether parking in the space is possible. Clearly the space needs to include enough margin over the length of the vehicle to ensure that
- 20 parking is possible. The microprocessor may include a difficulty scale which allows for the difference between an experienced and inexperienced driver, having at least two settings so that an inexperienced driver will be given a 'No' signal when the space is tight, whereas on an
- 25 experienced driver setting, the indication for that space would be a 'Yes' to indicate parking is possible.

Alternatively the display could include a difficulty scale, for example HARD, MEDIUM and EASY so that on indicating that

30 parking is possible within the space, the degree of difficulty is also displayed. This will help the driver to determine whether to attempt to park, dependant upon his experience, the road conditions and the time available to the driver.

35 Thus such an aid will greatly reduce the time taken in attempting to park in a space too small for the vehicle,

reduce damage to other vehicles and will increase the confidence of a driver when parking in a space which is big enough for the vehicle.

- 5 Preferably the predetermined area at the side of the vehicle extends up to 1.5m in front of and to the rear of the vehicle. Preferably the predetermined area extends to approximately 2m from the side of the vehicle.
- 10 The sensing system may be configured to measure the length of a parking space at the passenger side or drivers side of the vehicle. Preferably the system can assess parking spaces at both sides of the vehicle with the system including a switch to indicate which side of the vehicle the system is
- 15 operating.

Although the radar sensing system may be used in a vehicle, purely for use in the parallel parking aid, the invention is applicable with particular advantage to a vehicle in which

20 the radar sensing system is used also for providing driver information and warnings, such as a collision warning system or side vision aid. The advantage is that the same sensors are multifunctional.

- 25 Preferably the system includes at least two radar transmitters and receivers, which are impulse radar transmitters and receivers. Such a system could be used to track accurately the path of an object outside the vehicle to accurately predict the potential of a collision, its
- 30 likely position and time before impact. This would be useful in parking on a busy street where while concentrating on parking, the driver may fail to notice other moving vehicles. This is especially true where one of the first and second obstacles is a car which is moved while parking in
- 35 the space adjacent is taking place.

In the specification, the term 'impulse radar' is intended to encompass any radar signal of short radio frequency, without a carrier wave, and includes radar sometimes referred to as 'broadband radar.'

5

Brief Description of the Drawings

A parallel parking aid in accordance with the invention will now be described, by way of example only, with reference to
10 the accompanying drawings, in which:-

Figure 1 is a schematic block diagram of the parallel parking aid;

15 Figure 2 is a first schematic view of the predetermined area scanned by the radar receiver; and,

Figure 3 is a second schematic view of the predetermined area scanned by the radar receiver.

20

Description of the Preferred Embodiment

A parallel parking aid 1 is for aiding parking in a space 3 substantially parallel to the direction of the vehicle 5
25 between a first obstacle 7 and a second obstacle 9.

The parallel parking aid 1 comprises a radar sensing system 11 including at least two radar transmitters and receivers 13 arranged to detect the presence of an object in a
30 predetermined area in the region of the side of the vehicle, coupled to a microprocessor 17 arranged to produce a first obstacle signal indicative of the position of the first obstacle 7, and a second obstacle signal indicative of the position of the second obstacle 9, and from those signals
35 calculate the length of the parking space and feed a signal to a display 19 to indicate whether a parallel park should be attempted.

- The radar transmitters and receivers are impulse radar sensors which can detect objects in at least the predetermined area 15 to the side of the vehicle. Typically the vehicle will be at a distance of about 1m from the edge of the space (here indicated as distance x). Since the objects forming the obstacles are likely to be cars having an edge substantially perpendicular to the vehicle, it is not necessary for the area to be scanned to cover the entire width of the space 3. Here 1m into the space is scanned. A distance of approximately 1.5m in front of and to the rear of the vehicle has been found to be optimal for the sensing of objects to the side of the vehicle.
- 15 The display is in the instrument panel and displays two signals, the first being a length signal showing the length of the space and the second a Yes/No signal indicating whether a parallel park should be attempted.
- 20 In this case the radar system 11 comprises four sensors (not shown) mounted at the corners of the vehicle in the region of the bumper. Each sensor comprises an impulse radar transmitter and receiver. This arrangement of four sensors allows the envelope around the vehicle to be monitored. This arrangement of sensors allows the system to monitor a predetermined area at both sides of the vehicle so that parallel parking spaces at the driver side and the passenger side can be measured. The sensors are used for collision warning or side vision aids so that the sensors are multipurpose.

The choice of microprocessor and display will be readily apparent to the skilled addressee of the specification.

Claims

1. A parallel parking aid for aiding parking in a space substantially parallel to the direction of the vehicle
5 between a first and a second obstacle, and comprising a radar sensing system including at least two radar transmitters and receivers arranged to detect the presence of an object in a pre-determined area in the region of the side of the vehicle, coupled to a microprocessor arranged to
10 produce a first obstacle signal indicative of the position of the first obstacle, and a second obstacle signal indicative of the position of the second obstacle, and from those signals calculate the length of a parking space and feed a signal to a display to display whether a parallel
15 park should be attempted.

2. A parking aid according to claim 1, in which the microprocessor compares the length of the parking space with the length of the vehicle and feeds a signal to the display
20 to indicate a YES/NO display dependant on whether parking in the space is possible.

3. A parking aid according to claim 2, in which the aid is coupled to an experience switch switchable between at least
25 two settings, EXPERIENCED and INEXPERIENCED and the microprocessor operates in the EXPERIENCED setting to indicate that parking is possible when the space is over a predetermined first length, and operates in the INEXPERIENCED setting to indicate that parking is possible
30 when the space is over a predetermined second length, where the first length is less than the second length.

4. A parking aid according to claim 2, in which the display displays a difficulty scale and the microprocessor
35 calculates the difficulty of parking in a space dependant upon its length.

5. A parking aid according to any one of the preceding claims, in which the predetermined area at the side of the vehicle extends up to 1.5m in front of and to the rear of the vehicle.

5

6. A parking aid according to any one of the preceding claims, in which the predetermined area extends to substantially 2m from the side of the vehicle.

10 7. A parking aid according to any one of the preceding claims, in which the system may assess parking spaces to both sides of the vehicle, the system including a switch to indicate the side of the vehicle on which the space is situated.

15

8. A parking aid according to any one of the preceding claims, in which the radar sensing system is used also for providing driver information and warnings.

20 9. A parallel parking aid arranged substantially as herein described with reference to and as illustrated in figures 1 to 3 of the accompanying drawings.



The
Patent
Office



Application No: GB 9623640.1
Claims searched: 1-9

Examiner: Matthew Nelson
Date of search: 21 January 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): H4D (DRPB, DRPC, DRPD)

Int CI (Ed.6): G01S 13/88, 13/93; G08G 1/0962, 1/16;

Other: Online:- WPI, INSPEC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 3858204 (ROBBINS et al). See col 1, lines 14-52 & col. 3, lines 30-41	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

